DOCUMENT RESUME

ED 258 823 SE 045 819

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TITLE A Study of Incentive Programs for Mathematics and Science Teachers in the Fifty States and District of Columbia, 1983-1985.
PUB DATE Apr 85
NOTE 19p.
PUB TYPE Reports - Research/Technical (143)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Elementary Secondary Education; Financial Support; Higher Education; *Incentives; *Mathematics Education; Mathematics Teachers; *Science Education; Science Teachers; State Surveys; Teacher Certification; *Teacher Education; *Teacher Recruitment; *Teacher Shortage
IDENTIFIERS Mathematics Education Research; Science Education Research

ABSTRACT

A current shortage of mathematics and science teachers exists in the United States. In response to this shortage, several states established incentive programs to increase the number of students training in these shortage areas or to encourage current teachers to upgrade their preparation for teaching mathematics and science. This report reviews the findings of a survey that was conducted of all 50 states and the District of Columbia to determine the extent to which states are implementing incentive programs. A 100 percent return rate was achieved. Survey results are presented in table form. Responses from the questionnaires indicate that over 50 percent of the states and the District of Columbia have some form of incentive program as a response to the national shortage of science and math teachers. The most common form of incentive is a loan program with a forgiveness clause. The most common requirement for eligibility is preservice teacher preparation for mathematics and/or science teaching. Some states indicated that they would have had programs but a lack of legislation funding prevented it. Appendices include: (1) survey form; (2) listing of types of incentive programs; (3) funding allocation figures; and (4) discipline shortages of states with incentive programs. (ML)

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A STUDY OF INCENTIVE PROGRAMS FOR MATHEMATICS AND SCIENCE TEACHERS IN THE FIFTY STATES AND DISTRICT OF COLUMBIA 1983-1985

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SE 045 819

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A STUDY OF INCENTIVE PROGRAMS FOR MATHEMATICS AND SCIENCE TEACHERS IN THE FIFTY STATES AND DISTRICT OF COLUMBIA 1983-1985

Introduction

This report views mathematics and science teacher incentive programs throughout the United States and the District of Columbia. These incentive programs are a response to the increasing mathematics and science teacher shortage (Howe & Gerlovich, 1981; Olstad & Beal, 1981, 1984; Taylor, J. L., 1984; Yoetist & Nickel, 1984).

This study provides answers to the following questions:

1. How many states offer incentive programs for mathematics and science teachers?
2. What types of incentive programs are used in the various states?
3. What are the conditions for forgiveness of student loans?
4. What amount of money is spent or allocated for these programs? What part of these funds are spent for administration of the incentive program?
5. How many individuals are receiving funds through an incentive program?
6. What state agency administers the incentive programs?
7. What are the requirements for eligibility for funding from an incentive program?
8. Which states have evaluated their programs and what have they determined?

Procedure

A questionnaire was prepared and mailed to the chief education officer for each of the 50 states and the District of Columbia (Appendix A). Follow-up telephone calls were made and additional questionnaires mailed to states not responding by the requested date. The data from the surveys were summarized and any supporting documentation was reviewed. All 50 states and the District of Columbia responded. While the principal focus of the study was incentive programs, some states reported that their program also included other disciplines (Appendix D).

Findings

Question 1: How many states offer incentive programs for mathematics and science teachers?

In 1984-1985, 28 states had incentive programs (55 percent). Another eight states (16 percent) had proposals for incentive programs but did not fund them. Only 15 states (29 percent) had no incentive programs for mathematics and science teachers and had not proposed such programs (see Table 1 for summary).

Table 1
States Implementing Incentive Programs (1984-85)*

Status	Number	Percentage of States
Incentive Program	28	55
Proposed, Not Funded	8	16
Not Considered	15	29

*Includes District of Columbia

Question 2: What types of incentive programs were used in the various states?

Three types of incentive programs were the most common: loans, tuition reduction or waiver, and scholarships (see Table 2).

Table 2
Type and Usage of Incentive Programs

Type	Only This Incentive	This with Others	Total Using	Percentage Using (n = 28)
Loan	13	10	23	82
Scholarship	2	7	9	32
Tuition Waiver or Reduction	3	4	7	25

* Percentages do not total 100 due to some states using more than one type of program.

Loan programs varied in structure, but were the only incentive offered in thirteen states. Loans were offered in combination with additional incentives in ten other states. This was the most frequent combination of incentives. Thus 32 (82%) of the states offering incentives used loan programs. Loans were reported to be "forgiveness" loans by 17 states. Three states indicated forgiveness loan programs with reduced interest rates, and three did not include details.

Scholarship programs were the next most common type of incentive program. Two states used only scholarship programs and seven used scholarships along with other incentives. Nine (32% of the 28 states offering incentive programs) used scholarships.

Tuition waiver or reduction were incentive programs used by seven (25%) of the states offering incentive programs. Three states used these programs alone and four other states used them in combination with other incentive programs. Information for each state that had an incentive program for mathematics and science teachers is summarized in Appendix B.

Question 3: What are the conditions for forgiveness of student Loans?

Conditions for forgiveness of a loan varied among the states. In order for a loan to be forgiven, 15 states specifically stated that the recipient must teach in a public school in specific geographical regions of the state (Georgia and South Carolina).

Nine states reported that a full-time mathematics or science teaching position was required to qualify for forgiveness, three states accepted half-time or more, and the remaining 16 states did not specify the percentage of time needed to be devoted to science and mathematics.

The length of time spent teaching mathematics or science in order to have a loan forgiven varied widely. In Washington State ten percent of the loan is to be forgiven for each year of teaching mathematics or science. One year teaching will cancel one year of loan received in seven states: Georgia, Kentucky, Massachusetts, Mississippi, Nebraska, Tennessee, and Texas. For total cancellation of the loan, two years were required by Delaware and Iowa; three years by Alabama and Indiana; four years by Florida, Maine, and Vermont; and five years by Connecticut and South Carolina.

Question 4: What amount of money is being spent or allocated for the incentive programs? What part of these funds are used to administer the incentive programs?

For 1983-84, twelve states reported a total of $3,957,000 was being used to fund incentive programs. The range of funding was between $10,000 and $1,000,000, with an average per state of $329,750. For 1984-85, seventeen states allocated funds for incentive programs in the amount of $5,988,000. The range of funding was between $13,000 and $1,200,000, with an average of $352,600 (Appendix C).

The percentage of funds used to administer programs varied widely. Eleven of the twenty states responding to this question reported zero percent. The range reported was 0-20%, with an average of 2.6% spent for administration of programs (see Table 3).

Table 3
Money Allocated for Incentive Programs

	Range			
	Low	High	Mean	Total
Funds 1983-84	$10,000 -	$1,000,000	$329,750	$3,957,000
Funds 1984-85	$13,000 -	$2,200,000	$352,600	$5,988,000
Number of Recipients (1983-1985)	25 -	400	172	3,616

Question 5: How many individuals are receiving funds through an incentive program for the two-year span of 1983-195?

A total of 3616 individuals received funds. The range reported by the states was between 25 and 400, with an average of 172.

Question 6: What state agency administers the incentive programs?

Ten states indicated that the state department of education or public instruction administered the incentive programs, and six states had their

programs administered by the department of higher education or post-secondary education. Ten states indicated that the state agency for financial aid administered the funds. Two states indicated that agencies at the colleges or universities regulated the funds.

Question 7: What were the requirements for eligibility for funding from the incentive programs?

Two major criteria were considered to determine recipients of funds from the various incentive programs: (1) financial need, and (2) meeting specified professional purpose(s). Ten states required that the applicant for funding show financial need. All states required that recipients not be in arrears in payments for any present loans.

The specified purposes for funding varied, but three were most common: (1) work toward teacher certification in the areas of mathematics or science at the preservice level, (2) currently certificated to teach and to add an endorsement in science or mathematics, and (3) currently teaching science and mathematics and used to upgrade science or mathematics background.

Nine states reported incentive programs for preservice individuals only. Twelve states provided incentive funds for preservice as well as returning teachers. Two states funded only currently certificated teachers who were adding an endorsement in science or mathematics, but eleven states funded these people as well as others. In three states funds were provided

for current teachers of mathematics or science who needed to upgrade their science and mathematics backgrounds (Table 4).

Table 4
Basis for Providing Incentive Funds

Basis	Total	Percentage* (N = 28)
Financial need	10	36
Preservice math/science teacher	21	75
Adding endorsement in math/science	13	46
Upgrading in math/science	3	11

* Percentages do not total 100 due to some states using more than one basis for providing funds

Question 8: Which states have evaluated their programs and what have they determined?

Three states have already evaluated their programs, while ten states indicated that it was too early. Fifteen states did not respond to this question.

1. Indiana questioned the long-run benefits of the program because of the uncertainty that teachers would stay after the three-year required period for forgiveness of the loans. Since the state funded both preservice and current teachers of mathematics and science, the overall

increase in the number of science and mathematics teachers was not determined. Indiana sought to have more publicity and more clearly stated guidelines (Baird, 1984).

2. North Carolina's summer institute program with tuition waiver was evaluated. The evaluation was based on 51% response from the participants. It was determined that an adequate number of summer institutes could be run without using as many of the state colleges and universities as were used in the first year of the program (Taylor, P. H., 1984).

3. Washington indicated that the number of students in mathematics and science teacher preparation had increased. The state was also requesting a clarification of the state guidelines. An additional survey of the participants is being done to determine effectiveness of the forgiveness loan program in placing qualified teachers in the mathematics and science classrooms in the state of Washington (Beal, Olstad, & Harder, 1985).

Summary

This study indicates that over 50% of the states and the District of Columbia have some form of incentive program as a response to the national shortage of science and mathematics teachers. The most common form of incentive is a loan program with a forgiveness clause. The most common requirements for eligibility is preservice teacher preparation for

mathematics and/or science. Some states considered it important to find current teachers to change endorsement area to science or mathematics, and some states indicated that they would have had programs but finding was not legislated.

Approximately ten million dollars has been spent or allocated in the last two years for incentive programs by 28 states. Over 3,500 people received funds. Of the amount allocated, an average of 2.6% was spent per state on administrative expenses.

Conclusion

The incentive programs reviewed in this study are new programs and it is too early to determine their effect in providing qualified science and mathematics teachers. Most state chief education officers indicated indirectly that they were hopeful that the programs will continue.

This study shows not only a heightened awareness of the need to provide more qualified science and mathematics teachers, but also an active response by states to provide funds through incentive programs to meet this need.

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APPENDIX A
Survey of the States
Financial Incentive Programs for Science and Mathematics Teachers

The College of Education at the University of Washington is conducting a survey of states to determine their utilization of financial incentive program(s) that address the shortage of science and mathematics teachers. Please help by completing this form and returning it in the enclosed envelope.

Name of your state: _____

Name and title of person responding: _____

1.0 Does your state have programs that provide financial incentive to individuals who prepare for teaching in the areas of science or mathematics?
1.1 Yes ____ (continue at item 2)
1.2 No ____ (continue to 1.21-1.23 and return this form)

1.21 Has your state considered such a program(s)?
Yes ____
No ____

1.22 If yes, why has the program not been implemented?
_____(continue on back)

1.23 Thank you for indicating that your state does not have a financial incentive program(s) for science and mathematics teacher preparation. (Please return form.)

2.0 Details of your state financial incentive program(s):
2.1 Indicate the nature of the program(s):
____ a. loan program(s)
____ b. tuition reduction/waiver
____ c. salary supplement
____ d. scholarship
____ e. other _____

2.2 What office or agency administers the program(s)?
_____

2.3 Who is eligible to be a recipient under your program(s)?
_____(continue on back)

Appendix A (continued)

2.4 Please check one of the following time periods and then answer the three sub-questions based on that time period.

____ a. 1983-1983 academic year
____ b. 1984 calendar year
____ c. fiscal year (specify) _____
____ d. other (specify) _____

2.41 Total dollar amount $_____
2.42 Percentage spent for administration _____
2.43 Number of recipients _____

3.0 If your program(s) has been evaluated for effectiveness, please provide a copy of the evaluation result.

4.0 If you have a written description of the program(s), policies, regulations, etc., please include a copy with your response.

Thank you for your cooperation. Please reply before February 5, 1985 to 115 Miller Hall, DQ-12, University of Washington, Seattle, WA 98195.

Appendix B
Types of Incentive Programs for Mathematics and Science Teachers Listed by State

State	Loan	Tuition Waiver	Scholar-ship	Program
Alabama	yes		yes	
Arkansas	yes			
California	yes			
Connecticut	yes			
Delaware	yes			
District of Columbia		yes		
Florida	yes	yes	yes	
Georgia	yes			
Illinois		yes		
Indiana	yes	yes	yes	yes
Iowa	yes			
Kentucky	yes		yes	
Maine	yes			
Maryland		yes		
Massachusetts	yes			
Mississippi	yes			
Nebraska	yes			
New York	yes		yes	
North Carolina	yes		yes	yes
Oklahoma			yes	
Pennsylvania	yes		yes	
South Carolina	yes	yes		
Tennessee	yes			
Texas	yes	yes		
Vermont	yes			
Virginia	yes		yes	
Washington	yes			yes

Appendix C
Funding Allocations by States with Incentive Programs

State	Funds 83-84	Funds 84-85	Total Number of Recipients
Alabama	-	$1,000,000	262
Arkansas	$1,000,000	-	500
California		1,000,000	500
Connecticut	175,00	175,000	175
Delaware	200,000	200,000	---
District of Columbia	12,000	-	30
Florida	500,000	-	441
Georgia	-	135,000	97
Illinois	-	13,000	50
Indiana	50,000	150,000	357
Iowa	60,000	-	---
Kentucky	400,000	-	201
Maine	-	550,000	---
Maryland	-	42,000	39
Massachusetts	-	235,000	345
Mississippi	-	-	---
Nebraska	-	100,000	132
New York	-	-	---
North Carolina	-	425,000	300
Oklahoma	-	100,000	100
Pennsylvania	400,000	-	280
South Carolina	-	-	---
Tennessee	-	200,000	140
Texas	-	2,200,000	---
Utah	-	48,000	40
Vermont	10,000	-	25
Virginia	-	120,000	60
Washington	150,000	300,000	93

- Funding not reported
--- Number of recipients not reported

Appendix D
Discipline Shortages
States with Incentive Programs

State	Science and Mathematics	Others
Alabama	X	
Arkansas	X	
California	X	
Connecticut	X	Industrial Arts, Speech & Hearing
Delaware	X	
District of Columbia	*	*
Florida	X	
Georgia	X	Special Ed. & 31 others
Illinois	X	
Indiana	X	
Iowa	X	
Kentucky	X	
Maine	X	Special Ed.
Maryland	X	
Massachusetts	X	
Mississippi	X	
Nebraska	X	
New York	X	
North Carolina	X	
Oklahoma	X	Special Ed., Foreign Language, & Industrial Arts
Pennsylvania	X	
South Carolina	X	
Tennessee	X	
Texas	X	Others (did not specify)
Utah	X	
Vermont	X	
Virginia	X	
Washington	X	

* Information not included in response